Deer antlers: Traditional Chinese Medicine and Recently Developing Pharmaceuticals Based on Antler’s Unique Biological Phenomena

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Deer velvet antlers (VA), known as ‘Lu Rong’ in Chinese, are a common ingredient in Traditional Chinese Medicine (TCM). According to reports, there are more than 300 TCM prescriptions containing VA, which is considered the No. 1 animal-derived TCM. Prescriptions containing VA can be traced back to the first Chinese Materia Medica “Shennong Bencao Jing” (ca. 100 A.D.). However, use of VA appears to have been infrequent until deer were raised on farms, starting in the mid-16th century in China (Ming Dynasty period). In his “Compendium of Materia Medica”, Li Shizhen wrote that VA is good at reinforcing the kidneys to strengthen yang, promoting essence production, enriching the blood, supplementing the marrow, and invigorating bone health. Within the TCM system, VA is prescribed by a doctor to a patient for treating yang deficiency syndromes. In Asia, VA is dried and sold as slices or powder. The slices are then either put in alcohol and used as an aqueous alcohol extract or boiled in water with other herbs and consumed as a medicinal soup. The powder can also be encapsulated and consumed as a nutritional dietary supplement. Although VA remains a traditional remedy with scant science, its health claims are currently under intensive investigation through various Omics (transcriptomics, proteomics and metabolomics etc) and using in-vitro and vivo models.

Besides the use of VA in TCM, more recently, western-style pharmaceuticals derived from VA have been under development based on the antler’s unique biological phenomena in China. Here is just mention of a few. 1) Hard antler base-derived substances to reduce inflammation of glandular organs. Each year antlers (or antler buttons if removed during their growth for TCM use) die due to full calcification in fall.
Interestingly, the deer’s immune system does not sequester these dead tissues, but rather allows them to firmly and peacefully attach to their living pedicles until the spring of the next year, a period that is over half a year long. Research finds that hard antler bases/buttons are very rich in anti-inflammatory factors, which may have explained why these dead tissues can be tolerated by the living tissues (i.e. pedicles), without causing inflammation and sequestration. In vivo experiments have shown that antler button-derived extracts can effectively ameliorate or even cure mastitis, prostatitis and mumps in laboratory mice. Currently, new drugs have been under development based on this unique phenomenon and laboratory findings for treating inflammation of glandular organs in clinics, particularly those of chronic inflammation. 2) Antler stem cell-derived substances to induce regenerative wound healing. Casting of a hard antler/button leaves a huge wound (can be up to 10 cm in diameter) on the top of a pedicle. Astonishingly, this large mammalian wound not only heals within a week, but also leaves behind only a negligible scar. Previous research has found that this regenerative wound healing property solely relies on the existence of pedicle periosteum and the periosteal cells have stem cell attributes. Therefore, these cells have been termed antler stem cells (ASCs). Injection of the ASCs into rats can help punch-biopsy-wounds achieve regenerative healing. Furthermore, topical application of the conditioned medium from ASCs on wounds can reach similar healing results when compared with the ASC injections. New drugs are currently under development in various clinics based on this unique phenomenon and the laboratory findings for the achievement of scarless wound healing. 3) Deer blood-derived substances to reverse osteoporosis. Each year a mature male deer can grow antlers up to 30 kgs (such as wapitis), and these antlers must be fully mineralized in autumn before entering rutting season. Research finds that, in order to supply such a huge quantity of calcium, the whole deer skeleton has to be subjected to an annual cyclic attack of severe osteoporosis. Surprisingly, the severe osteoporotic status of a deer skeleton is fully reversed back to normal before the rutting season starts. This phenomenon is in sharp contrast to human bones where, once the osteoporotic process starts, there is no stopping it, and the most effective anti-osteoporotic drugs currently available can only slow down but not stop
the disease process. Intragastric administration of the substances derived from deer blood (collected during a special period) has been shown to effectively ameliorate the usually inevitable osteoporosis of ovariectomized rats. Based on this unique phenomenon and laboratory findings, new drugs are under development for treating human osteoporosis.